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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/214,708	01/11/1999	MITSUSHI ITANO	XI/P6217USO	8306

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EXAMINER

PERRIN, JOSEPH L

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 08/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/214,708

Applicant(s)

ITANO, MITSUSHI

Examiner

Joseph L. Perrin, Ph.D.

Art Unit

1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 08 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 11-22 is/are pending in the application.
- 4a) Of the above claim(s) 11-14, 16, 17, 21 and 22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 15 and 18-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114.

Applicant's submission filed on 08 July 2005 has been entered.

### ***Election/Restrictions***

2. In response to applicant's arguments that claims 16-17 should not be withdrawn from consideration and should be examined in the present application, it is noted that applicant has failed to provide sufficient showing of how or why the original Election of Species is improper or why the non-elected species should now be examined when the original Election of Species was deemed proper as evidenced by applicant's failure to traverse the Election of Species upon election of the species C3F6 (claim 15) and non-election of species C3F6O (epoxy) & C3F6O. The Election of Species issued 12 September 2000 has not been withdrawn and has been maintained throughout prosecution. Moreover, in the non-final Office action of 31 August 2004, the Examiner clearly indicated the withdrawal of the non-elected species of claims 16-17. It is further noted that Applicant's response of 29 December 2004 is silent with respect to the non-

Art Unit: 1746

elected species of claims 16-17. Thus, since the record is clear of the original Election of Species along with applicant's election, the original Election of Species is still deemed proper.

### ***Response to Arguments***

3. Applicant's arguments filed 08 July 2005 have been fully considered but they are not persuasive.

4. It is noted that applicant was put on notice in the Advisory Action that the ISAKI *et al.* document was untimely filed, but in the interest of compact prosecution applicant's arguments were addressed and found not persuasive in providing evidence of unexpected results. The response to arguments is repeated below.

5. In response to applicant's arguments that the ISAKI *et al.* document provides evidence for unexpected results, this is not persuasive because there is nothing in ISAKI *et al.* that provides any evidence (i.e. comparative data) to negate the obviousness rejection of GABRIC in view of YANAGIDA or SONY CORP. As clearly indicated in the final Office action, GABRIC is cited for the teaching of plasma etching/cleaning of chambers with fluorinated carbons, for instance, CF<sub>4</sub> and C<sub>2</sub>F<sub>6</sub>. GABRIC teaches each and every limitation of applicant's claimed invention with the exception of using an unsaturated fluorocarbon (i.e. C<sub>3</sub>F<sub>6</sub>) instead of a saturated fluorocarbon (i.e. C<sub>2</sub>F<sub>6</sub>). Both YANAGIDA and SONY CORP. are cited for the teaching that it is known in the semiconductor cleaning art to use unsaturated fluorocarbons (i.e. C<sub>3</sub>F<sub>6</sub>) in place

Art Unit: 1746

of saturated fluorocarbons due to the well-known dissociation of the double bond in unsaturated fluorocarbons (i.e.  $C_3F_6$ ) which produces a higher etching rate, thus a more efficient cleaning. Specifically, YANAGIDA teaches the unsaturated fluorocarbons having superior characteristics such as “high etchrate, high selectivity, low damage, and particularly low pollution” (column 3, lines 20-24). SONY CORP. teaches that unsaturated fluorocarbons are preferred due to the higher etching rate by dissociation of the unsaturated bond (column 7, line 46 and the abstract). The position is taken that a person of ordinary skill in the art would immediately recognize that using an unsaturated fluorocarbon (i.e.  $C_3F_6$ ) in place of a saturated fluorocarbon (i.e.  $C_2F_6$ ) would achieve a higher etch rate (more efficient cleaning).

6. Regarding applicant's arguments that using unsaturated fluorocarbon ( $C_3F_6$ ) produces unexpected results, particularly reduced cleaning time and better environmental results with less MMTCE, this is not persuasive because YANAGIDA addresses such results using  $C_3F_6$ , specifically citing superior characteristics such as “high etch rate [reduced cleaning time], high selectivity, low damage, and particularly low pollution [improved environmental results]” (column 3, lines 20-24). SONY CORP., as noted above, teaches similar high etching rates with  $C_3F_6$ . Accordingly, since YANAGIDA and SONY CORP. provide evidence that  $C_3F_6$  provides a high etch rate (reduced cleaning time) and low pollution (reduction in MMTCE and improved environmental results) similar to such properties argued by applicant as taught in ISAKI *et al.*, the position is taken that ISAKI *et al.* does not provide evidence of unexpected results because there

Art Unit: 1746

is nothing unexpected in achieving a higher etching rate with an unsaturated fluorocarbon ( $C_3F_6$ ) in comparison with a saturated fluorocarbon ( $C_2F_6$ ) in view of the teachings of YANAGIDA and SONY CORP. and one of ordinary skill in the art would expect such results in using  $C_3F_6$  as disclosed by YANAGIDA and SONY CORP. Moreover, the position is taken that one of ordinary skill in the art at the time the invention was made would have a reasonable expectation of success in using an unsaturated fluorocarbon ( $C_3F_6$ ) in place of a saturated fluorocarbon ( $C_2F_6$ ) to provide a higher etch rate in chamber cleaning, thus providing a more efficient cleaning system. Accordingly, the rejection is maintained for these reasons and reasons of record.

***Claim Rejections - 35 USC § 103***

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
8. Claims 15, 18, 19 & 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over GABRIC in view of YANAGIDA or SONY CORP. (previously cited).

GABRIC discloses a chamber cleaning method by treating a plasma CVD chamber of a semiconductor integrated circuit production device under chamber cleaning conditions using a plasma formed by the gas mixture of at least one fluorinated carbon, such as  $CF_4$  and  $C_2F_6$ , and oxygen ( $O_2$ ) (column 2, lines 3-5 & 27-44), thereby removing byproducts such as silicon and oxides and nitrides of silicon (column 1, lines 8-11;

Art Unit: 1746

column 1, line 59 – column 2, line 2; column 2, lines 29-33; column 3, lines 5-7).

Although GABRIC does broadly disclose the use of “at least one fluorocarbon” (column 3, lines 9-11), the need for increasing the amount of reactive fluorine to increase the etching rate (column 3, lines 15-19) and the advantages of a high etching rate, *i.e.* “the cleaning times are short while also being gentle on the materials” (column 3, lines 25-27), GABRIC does not expressly disclose  $C_3CF=CF_2$  ( $C_3F_6$ ) as the fluorinated carbon cleaning gas.

YANAGIDA teaches that it is known in the semiconductor art to substitute an unsaturated fluorocarbon, such as hexafluoropropene ( $C_3F_6$ ), for the well-known etching fluorocarbon gases, for instance  $C_2F_6$ , in the removal of silicon oxides due to the higher etch rate of  $C_3F_6$  and reduced amount of etching gas required as a result of the dissociation of the unsaturated bond to form two or more units of  $CF_x$  from one molecule of the etching gas (column 2, lines 1-4 & lines 40-55), and specifically for superior characteristics such as “high etch rate, high selectivity, low damage, and particularly low pollution” (column 3, lines 20-24). It is noted that “I

SONY CORP. also teaches that it is known in the dry etching semiconductor art that unsaturated gases with the basic formula of  $C_xF_y$ , where  $x=2$  or more, and  $y=2x$  or less, (and preferably  $CF_3CF=CF_2$ ), are

Art Unit: 1746

preferred due to the higher etching rate by dissociation of the unsaturated bond (column 7, line 46 and the abstract).

Therefore, the position is taken that a person of ordinary skill in the art at the time the invention was made would have been motivated to modify the cleaning method of GABRIC by substituting a saturated fluorocarbon gas with the unsaturated fluorocarbon gas (namely,  $\text{CF}_3\text{CF}=\text{CF}_2$ ) disclosed by either YANAGIDA or SONY CORP., in order to provide more efficient cleaning by plasma etching as well as other known characteristics such as lower pollution.

### ***Conclusion***

9. All claims are drawn to the same invention claimed in the application prior to the entry of the submission under 37 CFR 1.114 and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the application prior to entry under 37 CFR 1.114. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action after the filing of a request for continued examination and the submission under 37 CFR 1.114. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).



Art Unit: 1746

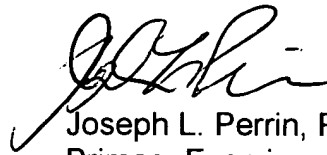
10. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph L. Perrin, Ph.D. whose telephone number is (571)272-1305. The examiner can normally be reached on M-F 7:00-4:30, except alternate Fridays.

12. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael E. Barr can be reached on (571)272-1414. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 1746

13. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Joseph L. Perrin, Ph.D.  
Primary Examiner  
Art Unit 1746

jlj